

Developing Quantum Dot Absorptive Filter Array based Miniaturized Spectrometer for Space Applications

Completed Technology Project (2016 - 2020)



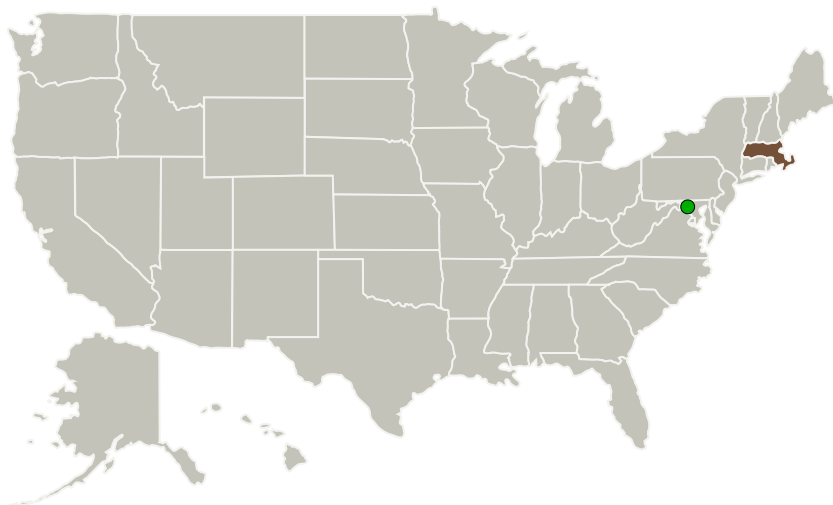
Project Introduction

The goal is to developing a miniaturized shortwave infrared (SWIR) spectrometer that is based on quantum dot absorptive filter array. The important features of the spectrometer are: small form-factor for portability, robustness due to absence of expensive and fragile dispersive optics, and quick acquisition due to the multiplexed filter array from which any arbitrary spectrum can be detected without scanning and be deconvoluted using a sophisticated algorithm. Different batches of quantum dots will be used as a unique filter and deposited on a solid substrate as an array. The filtered spectrum is recorded by the SWIR camera as an intensity profile and translated into a meaningful spectrum via reconstruction algorithm. The miniaturized quantum dot spectrometer can be used in environments where the form-factor of the spectrometer and fast acquisition capability is crucial, such as space applications.

Anticipated Benefits

This project will develop a miniaturized shortwave infrared (SWIR) spectrometer that is based on quantum dot absorptive filter array, with the following characteristics: small form-factor for portability, robustness due to absence of expensive and fragile dispersive optics, and quick acquisition due to the multiplexed filter array from which any arbitrary spectrum can be detected without scanning and be deconvoluted using a sophisticated algorithm. The miniaturized quantum dot spectrometer can be used in environments where the form-factor of the spectrometer and fast acquisition capability is crucial, such as space applications.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Massachusetts Institute of Technology(MIT)	Lead Organization	Academia	Cambridge, Massachusetts
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Massachusetts

Project Website:

<https://www.nasa.gov/strg#.VQb6T0jJzyE>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Massachusetts Institute of Technology (MIT)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

Moungi Bawendi

Co-Investigator:

Jason Yoo

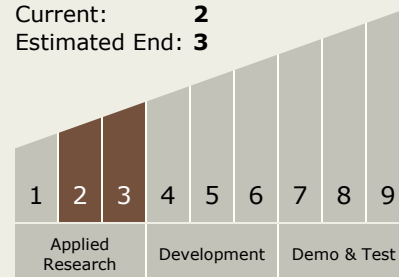
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Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.2 Avionics Systems and Subsystems
 - └ TX02.2.2 Aircraft Avionics Systems

Target Destinations

The Sun, Earth, Others Inside the Solar System